IN THE CLAIMS:

In line 1, delete "Patent Claims" and insert:

-- C L A I M S

What is claimed is: --

Please cancel claims 1-49 and add the following new claims 50-94:

1. - 49. (Canceled)

50. (New) Shell-and-tube type reactor for carrying out catalytic gaseous phase reactions, comprising (a) a bundle of contact tubes, through which the relevant reaction gas mixture flows, that extend between a gas intake-side tube sheet and a gas output-side tube sheet, that contain a catalytic filling, and that are flushed by a heat transfer medium inside a surrounding reactor shell; (b) a gas intake hood and a gas outlet hood spanning the two tube sheets, respectively, for providing the relevant process gas to the contact tubes and for evacuating the reacted process gas from the contact tubes; and (c) a process gas main pipe for feeding the process gas into the gas intake hood, the

improvement wherein the process gas main pipe comprises a first section, in which the process gas is in a non-explosive range, and in process gas flow direction behind it a second section, in which the process gas is in an explosive range; wherein the process gas main pipe comprises in its first section a check valve arrangement; and wherein the check valve arrangement and the gas intake-side tube sheet, and all parts therebetween, which bear the process gas pressure under normal operation conditions, are designed to withstand the maximum pressure caused by a deflagration or detonation.

51. (New) Shell-and-tube type reactor according to Claim 50, wherein the check valve arrangement comprises at least two paralleled check valves.

52. (New) Shell-and-tube type reactor according to Claim 50, wherein the process gas main pipe comprises at least one feed-in point for feeding in at least one of a partial quantity of, and a component of, the process gas, due to which the process gas passes from the non-explosive range into the explosive range.

53. (New) Shell-and-tube type reactor according to Claim 50, further comprising a device for injecting a flushing gas into dead spaces, in which the process gas prior to its entry into the contact tubes could otherwise fully or partially come to rest, the flushing gas being inert in relation to the relevant reaction.

54. (New) Shell-and-tube type reactor according to Claim 53, wherein flushing gas is injected radially outside of the contact tube bundle at the edge of the tube sheet on the gas intake side.

55. (New) Shell-and-tube type reactor according to Claim 54, wherein the flushing gas is injected with a tangential flow component.

56. (New) Shell-and-tube type reactor according to Claim 50, wherein the gas intake hood is designed flat and funnel-shaped and with a distance to the gas intake-side tube sheet, which decreases in the radially outward direction, and with a central gas intake.

57. (New) Shell-and-tube type reactor according to Claim 56, wherein the gas intake hood is rounded off at least approximately like a trumpet funnel and flattens out towards the edge.

58. (New) Shell-and-tube type reactor according to Claim 50, further comprising a flat funnel-shaped fitting arranged coaxially in a shell-shaped gas intake hood from which a central pass-through is connected, said fitting being sealed with respect to the gas intake hood, and the edge of said fitting being sealed towards the edge of the tube sheet on the gas intake side.

59. (New) Shell-and-tube type reactor according to Claim 58, wherein the fitting is rounded off at least approximately like a trumpet funnel and flattens out towards the end.

60. (New) Shell-and-tube type reactor according to Claim 58, wherein the fitting is supported at a plurality of points on the gas intake hood.

61. (New) Shell-and-tube reactor according to claim 60, wherein the points are substantially regularly spaced.

62. (New) Shell-and-tube type reactor according to Claim 58, wherein the seal on the edge of the fitting is to a limited extent gas-permeable and further comprising a device for injecting a flushing gas over the seal.

63. (New) Shell-and-tube type reactor according to Claim 62, wherein the seal on the edge of the fitting comprises a partially permeable material.

64. (New) Shell-and-tube type reactor according to Claim 62, wherein the seal on the edge of the fitting has discrete gas penetration channels.

65. (New) Shell-and-tube type reactor according to Claim 62, wherein the seal on the edge of the fitting comprises a profile which is flexible under high pressure.

66. (New) Shell-and-tube type reactor according to Claim 62, wherein the seal on the edge of the fitting is connected

on the outside with a space through which the flushing gas is fed.

67. (New) Shell-and-tube type reactor according to Claim 66, wherein the space is limited by a radially inside seal and a radially outside seal.

68. (New) Shell-and-tube type reactor according to Claim 67, wherein the flushing gas is under substantially high pressure than the external atmosphere.

69. (New) Shell-and-tube type reactor according to Claim 66, wherein the space includes the residual space of the gas intake hood.

70. (New) Shell-and-tube type reactor according to Claim 58, wherein at least one of the gas intake hood, the tube sheet on the gas intake side and the fitting are connected to each other via a welded lip seal.

71. (New) Shell-and-tube type reactor according to Claim 50, wherein a spike-shaped flow diverter is arranged on the

tube sheet on the gas intake side, pointed towards the gas intake and narrowing down in that direction.

72. (New) Shell-and-tube type reactor according to Claim 50, wherein a support for the gas intake-side tube sheet is disposed between the gas intake-side tube sheet and the gas output-side tube sheet and is mounted to the reactor shell.

73. (New) Shell-and-tube type reactor according to Claim 72, wherein the support at least in part comprises two metal components which extend radially outwardly from the reactor's longitudinal axis.

74. (New) Shell-and-tube type reactor according to Claim 73, with a ring-shaped contact tube bundle, wherein the support partially comprises an additional metal component in the tubeless interior of the contact tube bundle, said additional metal component in turn being supported by the radial metal components, said additional metal component having a shape selected from the group consisting of substantially cylindrical, prismatic, conic and pyramid-shaped.

75. (New) Shell-and-tube type reactor according to Claim 50, wherein the tube sheet on the gas intake side is heat-insulated.

76. (New) Shell-and-tube type reactor according to Claim 50, wherein a first process gas component flows in the process gas main pipe and the process gas main pipe comprises in the process gas flow direction prior to the gas intake hood a first feed-in point for a second process gas component to be added to the first process gas component and thereafter at least one second feed-in point for the rest of the second or an additional process gas component.

77. (New) Shell-and-tube type reactor according to Claim 76, wherein at least one mixer follows the last feed-in point.

78. (New) Shell-and-tube type reactor according to Claim 76, wherein at least one second feed-in point is formed by a fine sparging device with a number of sparging units distributed across the cross-section of the channel.

79. (New) Shell-and-tube type reactor according to Claim 78, wherein at least one of the sparging units include individual throttling devices and devices producing a twist.

80. (New) Shell-and-tube type reactor according to Claim 76, wherein at least one of the feed-in points is arranged to receive the associated process gas component in a liquid form.

81. (New) Shell-and-tube type reactor according to Claim 80, wherein said at least one feed-in point has means for injecting the liquid process gas component.

82. (New) Shell-and-tube type reactor according to Claim 80, wherein said at least one feed-in point is positioned such that the liquid process gas component is at least one of atomized and vaporized.

83. (New) Shell-and-tube type reactor according to Claim 80, wherein said at least one feed-in point has at least one of heating devices and heat insulation.

84. (New) Shell-and-tube type reactor according to Claim 76, wherein the check valve arrangement is located between the first and the second feed-in point.

85. (New) Shell-and-tube type reactor according to Claim 76, wherein a pressure reduction space is located between the first and the second feed-in point.

86. (New) Shell-and-tube type reactor according to Claim 85, wherein the pressure reduction space is formed at least partially by a chamber housing the check valve arrangement.

87. (New) A method of using the shell-and-tube type reactor according to Claim 50, comprising the step of carrying out gas-phase reactions for one of the group of processes consisting of oxidation, hydration, dehydration, nitration and alkylation.

88. (New) The method of using the shell-and-tube type reactor according to Claim 87, for providing a composition of matter selected from the group consisting of ketones, methyl-isobutyl-ketones, mercaptan, isoprene, anthrachinone,

o-cresol, ethylene hexane, furfurol, acetylene, vinyl acetate, isopropyl chloride, naphthalene acid anhydride, vinyl chloride, oxo-alcohol, pyrotol, styrol, methanformic acid nitrile, polyphenylene oxide, dimethylphenol, pyridinaldehyde, Therban, alpha olefins, vitamin B6, prussic acid, aniline, formic acid nitrate, difluoromethane, 4-methyl-2-pentanon and tetrahydrofuran.

89. (New) The method of using the shell-and-tube type reactor according to Claim 50, comprising the step of carrying out gas-phase reactions for one of the group of processes consisting of oxidation of dimethylbenzols (m,o,p) into the corresponding monoaldehydes and dialdehydes, oxidation of dimethylbenzols (m,o,p) into the corresponding monocarbonic and dicarbonic acids or their anhydrides, oxidation of trimethylbenzols into the corresponding monoaldehydes, dialdehydes and trialdehydes, oxidation of trimethylbenzols into the corresponding monocarbonic acids, dicarbonic acids and tricarbonic acids or their anhydrides,

oxidation of durol into pyromellitic acid anhydride,

oxidation of gamma picoline or beta picoline into gamma picoline-carbo-aldehyd,

oxidation of gamma picoline or beta picoline into iso-nicotinic acid or nicotinic acid,

oxidation of propene into acrolein,

oxidation of acrolein into acrylic acid,

oxidation of propane into acrolein,

oxidation of propane into acrylic acid,

oxidation of butane into maleic acid anhydride,

oxidation of refined product into maleic acid anhydride,

oxidation of i-butenes into methacrolein,

oxidation of methacrolein into methacrylic acid,

oxidation of methacrolein into methyl-methacrylate,

oxidation of i-butane into methacrolein,

oxidation of i-butane into methacrylic acid,

ammoxidation of dimethylbenzols (m,o,p) into the corresponding mononitriles and dinitriles,

ammoxidation of trimethylbenzols into the corresponding mononitriles, dinitriles and trinitriles,

ammoxidation of propane to acrylonitrile,

ammoxidation of propene into acrylonitrile,

ammoxidation of beta picoline into 3-cyanopyridine,

ammoxidation of gamma picoline into 4-cyanopyridine,

oxidation of methanol into formaldehyde,

oxidation of naphthalene and/or o-xylol possibly mixed into phthalic acid anhydride,

oxidation of ethane into acetic acid,

oxidation of ethanol into acetic acid,

oxidation of geraniol into citral,

oxidation of ethene into ethyloxide,

oxidation of propene into propylene oxide,

oxidation of hydrogen chloride into chlorine,

oxidation of glycol into glyoxal and

hydration of maleic acid anhydride into butane diol.

90. (New) A process for operating a shell-and-tube type reactor according to Claim 50, wherein the shell-and-tube type reactor is run in production operations with such a charge of a first process gas component with at least one further process gas component with which occasional deflagrations or even detonations may occur.

91. (New) A process for operating a shell-and-tube type reactor according to Claim 50, wherein for starting up the reactor the concentrations of the process gas components and possibly additional parameters as well are measured on an ongoing basis in such a way that the violence of deflagrations or even detonations occurring does not exceed that what is anticipated for operating conditions.

92. (New) Shell-and-tube type reactor according to Claim 63, wherein said material is graphite tissue.

93. (New) Shell-and-tube type reactor according to Claim 64, wherein said channels are drill holes.

94. (New) Shell-and-tube type reactor according to Claim 64, wherein said channels are furrows.